

EDUCATION FOR HOME TREATED DIABETIC PATIENTS

N. Maglaveras¹, G. Giaglis¹, D. G. Goulis², I. Lekka¹, A. Avramides², E. A. Balas³

¹Lab of Medical Informatics, Aristotle University of Thessaloniki, Thessaloniki, Greece

²Department of Endocrinology, General Hospital Hippocraton, Thessaloniki, Greece

³Center for Health Care Quality, University of Missouri, Columbia, Missouri, USA

Abstract-Home Care offers a new model of health care delivery that can improve quality of life, rationalize costs and achieve wellness. Contact centers can be used as an intermediate between patients and medical staff. The implementation of a contact center offers great opportunities for patient education in their own homes. The current work proposes a way of retrieving, filtering and structuring medical knowledge so that it can be presented to the patients in a user-friendly way using voice messages.

Keywords - Patient education, home care, Telemedicine, Call center

I. INTRODUCTION

Clinical evidence indicates that patient education can improve the quality of medical care, while in some cases also reducing the cost of it [1]. Basic knowledge about diabetes is a necessary prerequisite to effective disease management [2]. Patient education contributes also to behavior change for primary prevention of disease [3].

The goal of this paper is to suggest a way of structuring and presenting medical knowledge so that it can be used for educational purposes in an integrated contact center, as proposed in the IST project "Distance Information Technologies for Home care. The Citizen Health System (CHS)".

The available communication means between the CHS center and the patients include Internet, mobile WAP-enabled phone and common telephone. We have orientated towards the latter as we deal mainly with elderly people, having chronic home-cared diseases and their involvement with new technologies is limited. In addition the regular telephone is the cheapest technology with the widest penetration, compared to other means like PCs, Internet or mobile phones [4][5].

II. METHODS

A. Content

The content of the messages should cover various aspects of diabetes management, such as common mistakes and emergencies. According to a recent study, common causes of hypoglycaemia, the most dangerous diabetic situation, are dietary errors, incorrect doses of insulin, alcohol consumption and unusual physical exertion [6]. Smoking, alcohol and diet education using any communication channel can contribute to behavior change for primary prevention of the disease [2]. Finally, psychosocial aspects of living with diabetes have been specifically addressed in order to enhance patient empowerment [7]. The majority of messages are equally

educative for the patient as for members of the family who are occasionally engaged in his/her care.

B. Source of information

Evidence-based information on diabetes was gathered from medical textbooks and diabetes websites, such as Joslin Diabetes Center (<http://www.joslin.harvard.edu>), the American Diabetes Association (<http://www.diabetes.org>) and the Canadian Diabetes Association (<http://www.diabetes.ca>). The retrieved knowledge was filtered in accordance with the patients' needs and was classified in a hierarchical way, as shown in Table 1.

C. Message structure

Each one of the 18 messages contains a number of sentences, which, along with the salutation, add up to a 2 minute duration. According to the literature, this is the minimum of time a patient is willing to spend on listening to an educational message [8].

Optional questions at the end of the messages have been implemented, as a self-check of the clarity of the message and to keep the patient involved in the educative process. The answers are recorded; therefore, the patient's comprehension of the educational material can be evaluated. In addition, the medical staff can be provided with valuable data concerning the patients' understanding of diabetes self-care. Although most of the center's functionality is automated, in certain situations direct interaction with the caregivers is encouraged.

Every message can be further divided in smaller independent sections, no bigger than 160 characters that contain at least one bit of information. These sections, properly combined, can be used in the future for implementing educational mini-sessions via other means of communication e.g. SMS or WAP.

D. Message style and language

The messages have been written in plain every-day language; complex medical terminology was avoided. Whenever it was scientifically correct, terms that are used by patients were preferred. Extensive information on every aspect of diabetes was not our target. We tried for the messages to be understandable by the average diabetes patient, independent of age and educational level. Wherever possible, a personal tone was used to make patients feel friendlier towards the system.

Report Documentation Page

Report Date 25 Oct 2001	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle Education for Home Treated Diabetic Patients		Contract Number
		Grant Number
		Program Element Number
Author(s)		Project Number
		Task Number
		Work Unit Number
Performing Organization Name(s) and Address(es) Lab of Medical Informatics, Aristotle University of Thessaloniki, Thessaloniki, Greece		Performing Organization Report Number
Sponsoring/Monitoring Agency Name(s) and Address(es) US Army Research, Development & Standardization Group (UK) PSC 802 Box 15 FPO AE 09499-1500		Sponsor/Monitor's Acronym(s)
		Sponsor/Monitor's Report Number(s)
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes Papers from 23rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, October 25-28, 2001, held in Istanbul, Turkey. See also ADM001351 for entire conference on cd-rom., The original document contains color images.		
Abstract		
Subject Terms		
Report Classification unclassified	Classification of this page unclassified	
Classification of Abstract unclassified	Limitation of Abstract UU	
Number of Pages 3		

TABLE I
MESSAGES CUSTOMIZATION

	insulin	pill	diet	obese	eye	foot	renal	neuropathy	smoker
Prevention									
Understanding Diabetes Self-Care Complications Risk Factors Emergencies Foot & Skin Eye Exam Smoking					✓	✓	✓	✓	
	✓	✓				✓		✓	
					✓				✓
Glucose									
Glucose Monitoring Urine Testing Insulin Medication	✓								
	✓								
	✓								
		✓							
Diet and Activity									
Diet-Nutrition Meal Planning Exercise Weight Reduction Alcohol			✓	✓					
			✓	✓					
	✓		✓	✓					
			✓	✓					
				✓					

All the material was written in both Greek and English and maintained in a structured form, so that it is easily controlled and translated. Extra attention should be paid to complying with the cultural standards of the listener.

III. IMPLEMENTATION

Two different ways of using the call-center have been implemented: 1) Call-center initiated session and 2) Patient initiated session.

1) A customizable set of subjects is made for each patient, according to his/her diabetic profile (table 1). The system can automatically call the patient twice a week on a pre-scheduled time and start the educative session. For example the obese diabetic patient will be provided with an increased frequency of "Diet and Activity" messages.

2) In addition, each patient can interactively navigate through the message list and attend educational sessions when he/she needs some information on a specific subject. This way, the patients have the opportunity to listen to the educative material, whenever they have time and feel able of comprehending and subsequently internalizing the messages. For example a diabetic patient who was recently started on insulin may review the proper injection technique.

An interesting feature, especially for the older patients, is the 24-hours-a-day ability of the center to repeat the message as many times as needed [9]. This takes valuable time off caregivers and gives patients a feeling of self-efficacy.

IV. CONCLUSION

The proposed approach in patient education messages will be tested in a clinical trial for the management of diabetes. This trial will help evaluate user acceptance of the interface and the clinical effectiveness of the messages.

ACKNOWLEDGMENT

This work is part of the project "Distance Information Technologies for Home Care. The Citizen Health System (CHS)" (IST-1999-13352) funded by the European Commission.

REFERENCES

- [1] E.E. Bartlett, "How can patient education contribute to improved health care under prospective pricing?", *Health Policy*, vol. 6(3), pp. 283-94, 1986.
- [2] C.F Corbett, "Research-based practice implications for patients with diabetes. Part I: Diabetes knowledge", *Home Healthc Nurse*, vol. 17(8), pp. 511-8, Aug 1999.
- [3] P.D. Mullen, D.G. Simons-Morton, G. Ramirez, R.F. Frankowski, L.W. Green and D.A. Mains, "A meta-analysis of trials evaluating patient education and counseling for three groups of preventive health behaviors", *Pat Edu and Coun*, vol. 32, pp.157-173, 1997.
- [4] <http://europa.eu.int/ISPO/esis/default.htm>, date of visit: 20/5/2001.
- [5] Deloitte & Touche, "Health Information Society Technology Based Industry Study", pp 83-85, February 2000.

- [6] K.P. Ratzmann and E. Schimke, "Incidence of severe hypoglycemia in relation to metabolic control and patient knowledge", *Med Klin*, vol. 90(10), pp. 557-61, Oct 1995.
- [7] R.M. Anderson, M.M. Funnner, P.M. Butler, M.S. Arnold, J.T. Fitzgerald and C.C. Feste, "Patient empowerment", *Diab Care*, vol. 18(7), pp. 943-949, 1995.
- [8] R.H. Friedman, L.H. Kazis, A. Jette, M.B. Smith, J. Stollerman, J. Torgerson, et al., "A telecommunications system for monitoring and counseling patients with hypertension. Impact on medication adherence and blood pressure control", *Am J Hypertens*, vol. 9(4 Pt 1), pp. 285-92, 1996.
- [9] D. Morrow, V.O. Leirer, L.M. Carver, E.D. Tanke and A.D. McNally, "Repetition improves older and younger adult memory for automated appointment messages", *Hum Factors*, vol. 41(2), pp. 194-204, 1999.